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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/896,074 | 06/28/2001 | Thomas P. Glenn | G0037M | 9522 |

7590 09/18/2002

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EXAMINER

COLEMAN, WILLIAM D

ART UNIT PAPER NUMBER

2823

DATE MAILED: 09/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/896,074

Applicant(s)

GLENN ET AL.

Examiner

W. David Coleman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-21 is/are allowed.
- 6) ☒ Claim(s) 1-9, 11 and 12 is/are rejected.
- 7) ☒ Claim(s) 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152) _____
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2, 4, 5 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Bigler et al., U.S. Patent 4,760,440.

3. Pertaining to claim 1, Bigler discloses a semiconductor process as claimed. See **FIG. 2** where Bigler teaches a method comprising:

forming a central aperture **14** in a substrate;

forming an electrically conductive trace **26** on a first surface of said substrate, said trace comprising a tab (please note that a tab is defined as a projection and the projection in this case; projected in the horizontal direction)

5. The method of Claim 1 wherein said supporting

comprises flip chip mounting said image sensor to said tab.

and supporting an image sensor in said central aperture by said tab.

4. Pertaining to claim 5 Bigler teaches the method of claim 1 wherein said supporting comprises flip chip mounting said image sensor to said tab.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 2 recites the limitation "said trace sealing" in line 13. There is insufficient antecedent basis for this limitation in the claim.

7. Claims 3 and 4 are rejected under 35 U.S.C. § 112 as being dependent on rejected claim.

Claim Rejections - 35 USC § 103

8.

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 6, 7, 8, 9, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigler et al., U.S. Patent 4,760,440 as applied to claim 1 above, and further in view of Peterson et al., U.S. Patent 6,384,473 B1.

11. Bigler discloses a semiconductor process substantially as claimed as discussed above.

5. The method of Claim 1 wherein said supporting comprises flip chip mounting said image sensor to said tab.

Pertaining to claim 6, Bigler fails to disclose the method of claim 1 wherein supporting comprises forming a bump between a bond pad on a first surface of said image sensor and said tab. Peterson teaches forming a bump between a bond pad on a first surface of said image sensor

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and said tab. See **FIG. 3A** where Peterson discloses conductive bump 46 between bond pad 44 and image sensor 100. In view of Peterson, it would have been obvious to one of ordinary skill in the art to incorporate the process steps of Peterson into the Bigler semiconductor process because the flip-chip can be mounted via interconnect bump.

12. Pertaining to claim 7, Bigler fails to disclose the method of claim 6 wherein said image sensor further comprises an active area on said first surface of said image sensor, said active area being unobstructed by said tab. See **FIG. 3A** where, Peterson discloses an active area of image sensor being unobstructed by tab. In view of Peterson, it would have been obvious to one of ordinary skill in the art to incorporate the process steps of Peterson into the Bigler semiconductor process because the light-sensitive side is optically accessible through the window (Abstract, third sentence).

13. Pertaining to claim 8, Bigler fails to disclose the method of claim 7 further comprising coupling a window to said first surface of said image sensor, said window covering and protecting said active area. See **FIG. 3A** where, Peterson discloses coupling a window to said first surface of said image sensor, said window covering and protecting said active area. In view of Peterson, it would have been obvious to one of ordinary skill in the art to incorporate the process steps of Peterson into the Bigler semiconductor process because the window reduces the potential for contamination (Abstract, last sentence).

14. Pertaining to claim 9, Bigler fails to disclose the method of claim 8, further comprising directing radiation at said image sensor, said radiation striking said window, passing through said window, and striking said active area, said active area responding to said radiation. See **FIG. 3A** where, Peterson teaches directing radiation at said image sensor, said radiation striking

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said window, passing through said window, and striking said active area, said active area responding to said radiation. In view of Peterson, it would have been obvious to one of ordinary skill in the art to incorporate directing radiation as said image sensor, said radiation striking said window, passing through said window, and striking said active area, said active area responding to said radiation in the Bigler semiconductor process because, the image sensor contain photo-sensitive cells (column 1, line 26).

15. Pertaining to claim 11, Bigler fails to disclose the method of claim 1 wherein said forming an electrically conductive trace comprises:

coupling an electrically conductive sheet to said first surface of said substrate; and
patterning said sheet to form said trace. See **FIG. 3A** where, Peterson teaches coupling an electrically conductive sheet to said first surface of said substrate; and

patterning said sheet to form said trace **24**. In view of Peterson, it would have been obvious to one of ordinary skill in the art to provide a conductive trace because it provides for conducting an electrical signal between interior interconnect location 12 and exterior interconnect location 14 (column 6, lines 39-56).

16. Pertaining to claim 12, Bigler fails to disclose the method of claim 1 wherein an image sensor substrate comprises a plurality of substrates comprising said substrate, said method further comprising singulating said image sensor substrate. Peterson teaches an image sensor substrate comprises a plurality of substrates comprising said substrate, said method further comprising singulating said image sensor substrate. See **FIG. 3A**, where Peterson discloses a plurality of substrates and singulating said image sensor substrate. In view of Peterson, it would have been obvious to one of ordinary skill in the art to incorporate an image sensor substrate

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comprises a plurality of substrates comprising said substrate, said method further comprising singulating said image sensor substrate in the Bigler semiconductor process because the plurality of substrates form a dense, rigid insulating structure (column 9, line 1).

Objections

17. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Allowable Subject Matter

18. Claims 13-21 allowed.

19. The following is an examiner's statement of reasons for allowance: independent claims 13 and 18 are not anticipated nor obvious as to the semiconductor process of packing an image sensor wherein the image sensor having a central aperture in a substrate; forming interconnection ball apertures in substrate; forming traces coupled to a first surface of the substrate, said traces comprising tabs projecting beyond a sidewall of said central aperture, wherein ends of said traces seal interconnection ball aperture and supports image sensor.

20. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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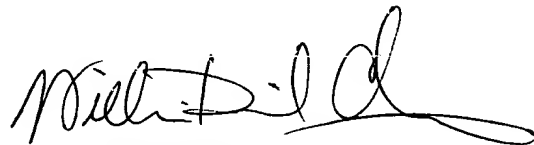
Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004.

The examiner can normally be reached on 9:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7721 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A handwritten signature in black ink, appearing to read 'W. David Coleman', with a long horizontal flourish extending to the right.

W. David Coleman
Examiner
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WDC
September 16, 2002